

DATA/CARTRIDGE



.....Pssst.
Go Cartridge!

D/C-1 and D/C-11 Cartridge Instrumentation Tape Recorders

UNATTENDED OPERATION . . . Unattended operation is completely practical with Data/Cartridge instrumentation recorders. There is no tape threading, no reels to install, and no arms, guides or levers to position. The only operator requirements are to slip in a cartridge, set the cartridge release-play lever, and press the record button (the entire operation takes about three seconds), and you can walk away and not return until the data has been recorded. A Data/Cartridge recorder will run unattended for hours, days or weeks. A full cartridge (1700') operating at 1 7/8 ips will cycle once every three hours . . . that means you have up to three hours after an event to recover the cartridge before the data is automatically erased and recycled; or, the recorder can automatically stop itself at the end of one full cycle with the end-of-tape sensing option.

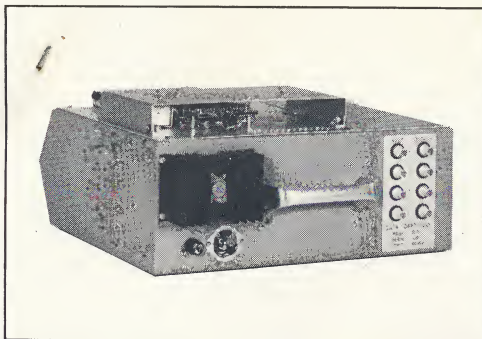
LONG TAPE LIFE . . . The standard tape furnished with cartridges purchased from Data/Cartridge can be run for at least 35,000 passes over the heads before showing excessive tape wear. This tape is 1/4-inch, tensillized Mylar, with lubrication on the back side. It is recommended for all tape loops with cycle periods longer than 30 seconds. For very short loops

(less than 30 second cycles), a special one-mil sandwich Mylar tape is available, which will allow approximately one million passes while exhibiting a continuous low noise level and low drop-out rate during most of its operating life. These unusually long life characteristics are the result of a simplified tape path and low tape hold-back tension . . . reel-to-reel recorders must maintain comparatively high tape tension (often exceeding 30 lbs.) to compensate for reel loading and continuously changing torques, whereas a tape cartridge automatically maintains a constant load and constant tape tension of several ounces. Not only is tape life extended, but head life is also increased (several thousand hours is not uncommon) and head cleaning requirements are far less stringent. When sandwich tape is used, there is no oxide deposited on the heads during the entire life of the tape.

INSTRUMENTATION PERFORMANCE . . . Data/Cartridge recorders are full performance instrumentation recorders with operating specifications in most cases superior to standard reel-to-reel instruments. DIRECT and FM solid-state electronics are on plug-in printed circuit boards. Standard tape speeds of 1 7/8, 3 3/4, 7 1/2 and 15 inches-per-second are instantly selectable from front panel controls. Single, dual-adjacent and four speed versions are available. Precision micro-gap heads are provided in two or four track IRIG-standard configurations and are fully adjustable in three planes for optimized performance. Start and stop times are in milliseconds at all tape speeds, with practically no tape stretch or overshoot.

FEATURES: No Mechanical Adjustments Required • 1 7/8, 3 3/4, 7 1/2 and 15 ips Tape Speeds • 4-Track IRIG Standard Heads • FM and DIRECT Electronics • Uses Standard NAB Cartridges • 35 Watts Power Input • 12-inch to 1700-foot Tape Loops • Continuous Unattended Operation • Truly "Portable" • Simultaneous Record and Reproduce





D/C-1 Rear View, Showing Input/Output Connectors.

FM AND DIRECT MODES . . . Data/Cartridge recorders are designed to operate in both FM and DIRECT modes with changeover accomplished simply by exchanging the plug-in record/reproduce cards for each channel . . . no readjustment of the equipment is necessary. In FM mode, these cartridge recorders are ideal for DC and low frequency recording where precise accuracy is required. In an FM record system the accuracy is primarily dependent on the FM record oscillator stability. A typical D/C-1 in FM mode will provide an overall record/reproduce accuracy of 0.25% or better. In DIRECT mode, the record accuracy is limited by the tape quality (within ± 1 db). 2% accuracy is considered typical. DIRECT recording is best suited for storing AC-type information where higher frequency response is desired rather than slow changing or DC level response.

FAST FORWARD OPTION . . . An optional fast forward speed control is available in both the D/C-1 and D/C-11 recorders. This unique feature provides adjustable servo-controlled forward speed for rapid searching of the tape loop. Tape can be advanced at high speed until a desired portion of the tape is reached, then run at normal playback speed to read information from the tape. The fast forward feature also permits accurate time-base compression since the servo circuits provide tape-speed stability in the order of 0.1%. When end-of-tape sensing is used, the tape will automatically stop upon reaching the sensing foil, at fast forward speeds as well as standard speeds.

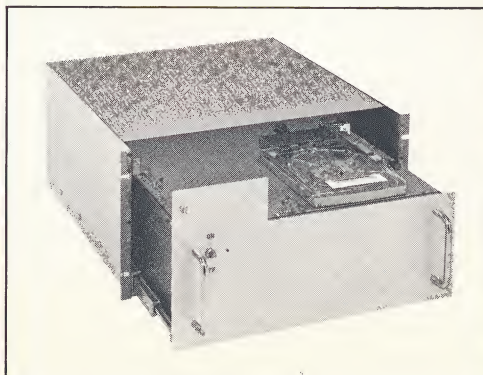
ERASING . . . Unless continuous cycles of record-reproduce-erase or reproduce-erase-record (for time-delay loops) are required, it is standard practice to erase using a bulk tape degausser. Tapes may be quickly degaussed (in the cartridge) by passing the bulk tape degausser over the bottom of the cartridge in the same way a reel of tape is normally erased. Simple audio tape degaussers are sufficient to clean the tape to virgin level, and are obtainable from most supply houses. An optional erase head can be provided on D/C-1 and D/C-11 recorders in place of the end-of-tape sensing head; DIRECT recorded data (on one or more channels) requires a separate oscillator to provide AC erase when using an erase head. Only FM data may be erased using DC through the erase head.

LOW MAINTENANCE . . . Data/Cartridge recorders are designed to operate without malfunction for long periods of time. There are no mechanical adjustments and the two moving parts which comprise the tape transport are precision components, built to operate continuously for thousands of hours. The few basic electrical adjustments are preset at the factory and are designed to stay in adjustment indefinitely. The motor is an "inside-out" cool-running hysteresis synchronous unit . . . bearings are good for at least 5,000 hours unattended and over 25,000 hours if lubricated. If you insist on performing maintenance, you can always clean the capstan and oil the motor bearings; there's little else you can do to these two moving parts!

RACK-MOUNT D/C-11 . . . The D/C-11 Cartridge Tape Recorder is similar to the D/C-1 portable unit, omitting channel controls and related circuits. The addition of sequentially interlocked electronic functions provides completely fool-proof operation. Once a cartridge is inserted and the power switch is turned on, the reproduce and record circuits are automatically delayed-on. Only two front panel controls are available to the operator . . . a power ON/OFF switch and a cartridge-eject lever. A cartridge cannot be removed unless the power switch is in the off position . . . then the eject lever is depressed and the cartridge is released and automatically ejected from the front panel for convenient removal. The D/C-11 is supplied with front panel lock, removal handles, dust cover and Grant chassis slides. Total rack panel height is 8 3/4 inches. All performance specifications and options are identical to the D/C-1 portable recorder/reproducer.

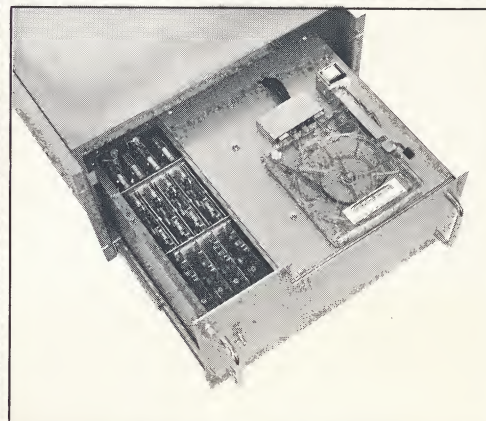
STANDARD NAB CARTRIDGES . . . Both the D/C-1 and D/C-11 recorders use NAB approved tape cartridges, such as those currently in standard use by the broadcast industry. These cartridges are available in three sizes; however, the small size cartridge is not recommended for use with Data/Cartridge equipment since it has provisions for use with only two heads. The medium and large size cartridges may be used interchangeably without affecting operation. Data/Cartridge stocks both cartridge sizes, containing various length

D/C-11 Rack Mounted Recorder.



tape loops (from 12 inches to 1700 feet). For best performance and reliability, D/C supplied cartridges are individually inspected and tested to assure quality. They are also slightly modified to optimize performance. The tape and recording format used in these cartridges is compatible with all instrumentation 1/4" reel-to-reel recorders, and can be removed from the cartridge and threaded onto a reel if so desired.

SOPHISTICATED ELECTRONICS . . . All Data/Cartridge equipment uses current state-of-the-art electronics providing maximum performance at minimum cost. Most circuits use silicon planar epitaxial components. All FM electronics, tape speed tuning elements and filters, and DIRECT reproduce tape speed equalizers are provided by miniature modules which plug into the record and reproduce cards. Separate modules are available for each speed selection; however, a single module can be used for two adjacent speeds (with only slight degradation of signal-to-noise ratio at lower speed). Efficiency of the D/C-1 and D/C-11 is extremely high, as indicated by the total power consumption of approximately 35 watts (including motor) for a full four channel system.



Plug-In Electronics Cards in D/C-11.

PORTABLE MEANS 34 LBS. TOTAL

The D/C-1 is a portable instrument. One person can hand carry it from laboratory to vehicle to field location, and back again . . . without incurring medical bills. There is a single handle attached to the rear for one-hand carrying. The D/C-1 does not have self-contained batteries, but there are numerous battery packs and DC-to-AC inverters available that will do the job (only 35 watts required). The D/C-11 rack mounted version is not portable, but the Grant chassis slides make it accessible for routine maintenance and it may be carried by the panel handles.

PSSST . . . GO CARTRIDGE!

SPECIFICATIONS

D/C-1 and D/C-11 RECORDER/REPRODUCER

Tape Speeds: 1 7/8, 3 3/4, 7 1/2 and 15 ips are standard speeds for models with two or all four speeds. Other speeds available on special order.

Models: Basic recorders are furnished with either two or four track microgap instrumentation heads, and any combination of FM and DIRECT plug-in electronics for up to four channels record and/or reproduce.

Wow and Flutter: Less than 0.1% RMS over the range of 0 to 300 Hz at 7 1/2 ips.

Cartridges: Uses medium or large size standard NAB Fidelipac® type cartridges. Accommodates up to 1,700 feet of lubricated, 1/4-inch, 1 mil base Mylar tape in an endless loop. Maximum tape footage provides 45 minutes recording time at 7 1/2 ips, or 90 minutes at 3 3/4 ips, etc.

Heads: Microgap, 2 track or 4 track, metal-faced. Up to three heads are standard; consisting of Record, Reproduce and choice of either Erase or End-of-Tape Sense Head. Special heads available; with a maximum of four heads per cartridge being possible.

OPTIONS

(Standard)

- 2 or 4 track Microgap heads, in any desired sequence
- 1, 2, or 4 speed operation
- DIRECT and/or FM electronics (standard 40% deviation FM)
- FAST FORWARD control (servo controlled and continuously variable)
- ERASE head
- END-OF-TAPE sensing head
- Individual channel record controls

Erase: Optional DC erase is suitable for FM recorded data; for erasing DIRECT recorded data, an optional erase oscillator is also required (for AC erase). Bulk erasing is normally preferred for DIRECT record applications.

Bias: High frequency AC at 200 KHz approximately (for DIRECT recording only).

Power Requirements: Approximately 35 watts total at 105 to 125 VAC, 60 Hz 220 VAC and/or 50 Hz is optional.

Dimensions: D/C-1: 6" high by 16" wide by 15" deep.

OPTIONS

(Special — consult factory for details)

- Non-standard speeds
- Special head configurations
- Remote control provisions
- Custom packaging
- Balanced differential inputs
- 600-ohm line input or output
- Automatic channel sequencing, without delay (12 hours recording for 1 channel, at 1 7/8 ips)
- Special applications modifications

D/C-11: 8 3/4" vertical rack space (19" rack width).

Weight: D/C-1: 34 lbs. approximately, complete with full set of four record and four reproduce electronics.

D/C-11: 40 lbs., complete as above.

Electronics: Miniature, all solid-state silicon planar, on separate plug-in epoxy-glass circuit boards; FM and DIRECT plug-in cards are interchangeable; tuning elements and equalizing modules plug into appropriate record/reproduce cards.

Input/Output Connectors: BNC type.

FM RECORD/REPRODUCE:

RECORD/REPRODUCE FREQUENCY RESPONSE

Tape Speed	Single Bandwidth Center Carrier Frequency	Single Bandwidth *Frequency Response	Single Bandwidth RMS Signal-to-Noise	**Double Bandwidth Specifications
15 ips	13.5 KHz	0 - 2,500 Hz	41 db	Twice the frequency response shown, for any given tape speed, at approximately 2 or 3 db lower signal-to-noise ratio than for single bandwidth
7 1/2 ips	6.75 KHz	0 - 1,250 Hz	43 db	
3 3/4 ips	3.37 KHz	0 - 625 Hz	40 db	
1 7/8 ips	1.68 KHz	0 - 312 Hz	38 db	

* ± 1/2 db, and based upon ±40% deviation for full scale signal (1 Volt RMS). Figures are for large cartridge with full tape load.

** Center carrier frequencies are double the standard frequencies at each tape speed.

Total Harmonic Distortion: Less than 1%

Linearity: DC (at all tape speeds) is 0.5% of full bandwidth

DC Drift: Less than 2% (overall) of full bandwidth for a change of temperature in the range 40°F to 120°F, following initial warm-up of several minutes, combined with a line voltage variation of 105 to 125 Volts

Input Level: 1 Volt RMS for full scale. (0.5 to 10 Volts RMS adjustable by pot.) Unbalanced to ground. Balanced input is optional

Input Impedance: 20,000 ohms minimum, unbalanced to ground

Output Level: 1 Volt RMS full scale across 10,000 ohms for ±40% deviation (100% modulation)

Polarity: A positive input signal produces an increase in frequency

FM Center Frequency Tuning Elements and Filters: FM Record Amplifier card has plug-in center frequency module (one for each speed). FM Reproduce Amplifier card has plug-in center frequency module and plug-in low-pass output filter module (one for each tape speed)

FM Record Amplifier Controls: Level Control, Center Frequency Trimmer, Zero Balance Trimmer

FM Reproduce Amplifier Controls: Level Control, Zero Balance Trimmer

DIRECT RECORD/REPRODUCE:

RECORD/REPRODUCE FREQUENCY RESPONSE

Tape Speed	Standard Bandwidth RMS Signal-to-Noise at 40 db *Frequency Response	Standard Bandwidth RMS Signal-to-Noise at 43 db *Frequency Response	Double Bandwidth RMS Signal-to-Noise at 37 db *Frequency Response
15 ips	50 - 30,000 Hz	300 - 30,000 Hz	300 - 50,000 Hz
7 1/2 ips	50 - 15,000 Hz	300 - 15,000 Hz	300 - 25,000 Hz
3 3/4 ips	50 - 7,500 Hz	300 - 7,500 Hz	300 - 12,500 Hz
1 7/8 ips	50 - 3,750 Hz	300 - 3,750 Hz	300 - 7,500 Hz

* ±3 db, and referred to 1.0 Volt RMS and 1% distortion at 1,000 Hz. If bias set to 3% distortion (as in audio applications) 12 db can be added to all figures.

Equalization: Plug-in module (one for each tape speed), plugs into reproduce card

Bias Frequency: 200 KHz approximately

Total Harmonic Distortion: 1% at 1,000 Hz

Input Level: 1 Volt RMS for full scale. (0.1 to 10 Volts RMS adjustable by pot.) Unbalanced to ground

Input Impedance: 100,000 ohms (optional 600 ohms)

Output Level: 1 Volt RMS across 10,000 ohms at normal recording level (1% distortion) full scale

Output Impedance: Output is developed across 600 ohms in series with approximately 25 µfd, unbalanced to ground. 600 ohms maximum loading

Director Record Amplifier Controls: Level Control, Bias Level

Direct Reproduce Amplifier Controls: Level Control, Equalization Trimmer

DATA/CARTRIDGE

ONE YEAR WARRANTY: Data/Cartridge Instrumentation Cartridge Recorders are precision built quality instruments and are fully guaranteed against defective operation resulting from faulty parts or workmanship for a period of one year after delivery. Tape cartridges and magnetic tapes are guaranteed against initial defects only if obtained from Data/Cartridge or its authorized representatives. Worldwide sales representatives and factory personnel provide field service and application assistance. In Europe and Canada, sales offices and agents of Sangamo Electric Company, Electronics Systems Division, provide field service and application assistance.

DATA CARTRIDGE, INC. • 161 Constitution Drive, Menlo Park, California 94025 • (415) 323-9880

Rep:
TRAVCO Associates, Inc
142 Mineola Ave
Roslyn Heights, N.Y. 11577

COMPLETE LIST PRICES

STANDARD DATA/CARTRIDGE MODEL D/C-1 PORTABLE TYPE: AND MODEL D/C-11 SINGLE CONTROL RACK-MOUNTED CARTRIDGE INSTRUMENTATION TAPE RECORDER/REPRODUCER

Basic D/C-1 Cartridge Tape Transport, for 1/4" Tape, four speeds: 1-7/8, 3-3/4, 7-1/2, and 15 i.p.s.; with Power Supply for up to four channels, in portable steel case; less magnetic heads and electronics.	\$995.00
Basic D/C-1 Tape Transport, with two speeds only (any adjacent pair)	945.00
Basic D/C-11 Cartridge Tape Transport for 1/4" Tape, four speeds: 1-7/8, 3-3/4, 7-1/2 and 15 i.p.s.; with Single Control switch (Power); with Power Supply for up to four channels; in Rack Mounted Case, with Grant Slides and Dust Cover; 8-3/4" Panel (19" width), less magnetic heads and electronics	895.00
Basic D/C-11, with two speeds only (any adjacent pair)	845.00
Fast Forward, continuously variable speed, servo-controlled option	275.00
Two Track Microgap Record Head	55.00
or optional:	
Four Track Microgap Record Head	180.00
Two Track Microgap Reproduce Head	55.00
or optional:	
Four Track Microgap Reproduce Head	180.00
*Sense Head, or Erase Head (full erase)	25.00
Direct Record Amplifier, Plug-in, solid state (silicon planar) with Bias Oscillator (Handles up to four Direct Record channels)	105.00
Direct Record Amplifier, Plug-in, solid state (silicon planar)	75.00
Direct Reproduce Amplifier, Plug-in, solid state (silicon planar) with Plug-in Equalizer (specify tape speed)	75.00
Plug-in Equalizer (specify tape speed)	25.00
FM Record Amplifier, Plug-in solid state with Plug-in Center Frequency Tuning Element (specify tape speed)	135.00
FM Reproduce Amplifier, Plug-in solid state (silicon planar) with Plug-in Discriminator Tuning Element and Plug-in Low-Pass Output Filter (specify tape speed)	225.00
FM Limiter, Plug-in solid state (<u>Replacement only, for early models</u>)	85.00
FM Discriminator, Plug-in solid state, with fixed center frequency tuning element, and low pass filter (specify tape speed. (<u>Replacement only, for early models</u>))	135.00
FM Record Amplifier Plug-in Tuning Element (specify tape speed)	30.00
FM Discriminator Plug-in Center Frequency Tuning Element (specify tape speed)	35.00
FM Discriminator Plug-in Low-Pass Filter (specify tape speed)	40.00
Rack Mounting Adapter Tray (for 19" Rack width) for Model D/C-1 portable Recorder/Reproducer	85.00
600 ohm line input and line output option is available for Direct Record and Reproduce Amplifiers, on special order at \$35.00 per channel extra.	
*D.C. erase is normally provided with erase head. A.C. erase (for erasing Direct Recorded data) requires Erase Oscillator at \$85.00 extra. Choice of <u>either</u> end-of-tape sense head or erase head (not both heads) is optional.	

Prices effective June, 1966, subject to change without notice.

SEE SEPARATE PRICE LIST FOR TAPE CARTRIDGES AND MAGNETIC TAPE

Data/Cartridge, Inc., 161 Constitution Drive, Menlo Park, California 94025 -- (415) 323-9880

COMPLETE LIST PRICE SCHEDULE

for

DATA/CARTRIDGE, INC. CARTRIDGES AND TAPE

Tape Cartridges are N.A.B. standard units of the "Fidelipac" type. They are available in three sizes; however, the smallest size is not normally used with Data/Cartridge tape recorders and is not stocked. All cartridges furnished are inspected and tested to insure meeting specifications, when used with Data/Cartridge tape recorders. Modified cartridges should be used only as recommended by Data/Cartridge, for those applications requiring their use, with Data/Cartridge tape recorders.

Tape furnished is 1/4" REEVES UNI-LUBE 441-75T Cartridge tape. It is .75 mil. tempered (low stretch) Mylar, with lubricant on the back side. This tape is provided for all cartridges with tape loops longer than 18 ft. (20 seconds, at 7-1/2 ips tape speed) total length. Special 1/4", 1 mil. Mylar "Sandwich" tape (non-lubricated) is furnished for tape loops of 18 ft. or less. This tape provides exceptionally long life for very short tape loops, but can only be used in short lengths and only with modified tape cartridges (using an added tape-tensioning spring). Any other tapes used with Data/Cartridge tape recorders, will result in shortened tape life and variations from published specifications.

Large Cartridge, less tape	\$ 6.00
Large Cartridge, with any length tape (with or without end-of-tape sensing foil) from 20 ft. to 1700 ft (45 minutes maximum at 7-1/2 ips).	14.00
Large Cartridge, modified for four (4) head stations (<u>modified</u> from standard 3), adds \$1.00 to above quoted large cartridge prices.	
Medium Cartridge, less tape	4.75
Medium Cartridge, with any length tape (with or without end-of-tape sensing foil) from 20 ft. to 900 ft. (24 minutes, maximum at 7-1/2 ips)	9.00
Medium Cartridge, modified with short loop, tape tensioning spring, adds \$1.00 to above quoted medium cartridge prices.	
Alignment Cartridge, with tape, for head alignment	18.00
Magnet Erase, a cartridge modification providing a special magnet, for continously erasing tape (through the back-side) may be added to any tape cartridge listed above at \$1.00 extra. (Once added, it cannot be removed from the cartridge).	

Quantity price discounts, starting above 100 units, available from factory upon request.

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